SMALL NAVIGATION PROJECT

GREAT CHEBEAGUE ISLAND

CUMBERLAND, MAINE

DETAILED PROJECT REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

JUNE 1973

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

IN REPLY REFER TO:

NEDED-R

5 June 1973

SUBJECT: Detailed Project Report for Small Navigation Project, Great Chebeague Island, Maine

HQDA (DAEN-CWP-E)
WASH DC 20314

1. In accordance with ER 1165-2-14, Paragraph 14a(5), there are submitted 10 copies of the subject report dated 5 June 1973.

2. Officials of the Town of Cumberland, Maine have stated that the Town is not financially able to provide their share of the first cost of construction of the project at the present time.

3 Although the report finds an improvement project to be economically justifiable, it recommends no Federal improvements to be made at Great Chebeague Island, Maine at this time.

JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer

Incl.
as

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GREAT CHEBEAGUE ISLAND, CUMBERLAND, MAINE

PERTINENT DATA

1. Purpose. To provide a sufficiently deep anchorage and fairway in the vicinity of the town pier on Great Chebeague Island, Cumberland, Maine to meet the present and future needs of recreational and commercial navigation in the study area.

2. Location. Approximately 8 miles northeast of Portland, Maine in Casco Bay.

3. Existing Federal Project. There is no existing Federal project at Great Chebeague Island. The nearest existing Federal navigation project is at Royal River in Yarmouth, three miles further north on the mainland.

4. Improvements Desired. Anchorage area to accommodate recreational fleet; improved access to town pier.

5. Considered Improvement. Fairway, 100-feet wide, 6 feet deep, 650 feet long, running northwest from town pier with anchorages on either side at the same depth having a total area of 14 acres.

6. Estimated Project Cost.

Dredging-Ordinary materials 60,000 c.y. at $4.00	=	$240,000
Contingencies (15%)	=	36,000
Engineering & Design	=	23,500
Supervision & Administration	=	33,500
TOTAL PROJECT CONSTRUCTION COST		$323,000
Aids to Navigation (estimated)		2,000
TOTAL FEDERAL & NON-FEDERAL COSTS		$325,000

7. Annual Benefits.

Recreational Boating Benefits:

Existing Fleet	$ 9,700
Equivalent Attracted Transients	300
New Boats Immediately Added	7,600
New Boats, Normal Growth	18,100
TOTAL	$35,700

87.8%

Commercial Benefits:

Charter Boats	$ 1,100
Auto Barge	3,850
TOTAL	$ 4,950

12.2%

TOTAL ANNUAL BENEFITS $40,650

8. Apportionment of Costs Among Interests.

Federal

1. 50% of 87.8% of total construction costs (0.50 x 0.878 x 323,000)	-	$141,800
2. 100% of 12.2% of total construction costs (1.0 x 0.122 x 323,000)	-	39,400
3. Aids to navigation (estimated)	-	2,000
TOTAL FEDERAL FIRST COST		$183,200

Non-Federal

50% of 87.8% of total construction costs (0.50 x 0.878 x 323.000)	-	$141,800
TOTAL NON-FEDERAL COST		$141,800

9. Annual Charges.

Federal		
Interest and amortization on first costs .05906 (183,200)	-	$10,800
Maintenance -		
Dredging - 12.2% of $8,000	-	1,000
Navigation Aids	-	500
TOTAL FEDERAL		$12,300
Non-Federal		
Interest and amortization on first costs .05906 (141,800)	-	$ 8,400
Maintenance -		
Dredging - 87.8% of $8,000	-	7,000
TOTAL NON-FEDERAL		$15,400
TOTAL ANNUAL CHARGES		$27,700

10. Benefit - Cost Ratio.

$40,650/27,700 = 1.5

11. Requirements of Local Cooperation.

a. Contribute 50 percent of the first cost of that portion of the proposed improvement attributed to recreational boating, estimated at $141,800;

b. Assume full responsibility for all project costs in excess of the $1,000,000 Corps of Engineers limitation under Section 107 of the 1960 River and Harbor Act as amended;

c. Perform or contribute the cost of performance of the operation and maintenance of the general navigation features proposed under this project, estimated to be $7,000 annually;

d. Provide without cost to the United States, all lands, easements and rights-of-way required for construction of the project and for aids to navigation upon request of the Chief of Engineers;

e. Hold and save the United States free from damages which may result from construction of the project;

f. Establish regulations prohibiting discharge of pollutants in the waters of the harbor by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State, and local authorities responsible for pollution and control;

g. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

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DEPARTMENT OF THE ARMY
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REPLY TO
ATTENTION OF:

NEDED-R

5 June 1973

DETAILED PROJECT REPORT
SMALL NAVIGATION PROJECT

GREAT CHEBEAGUE ISLAND, CUMBERLAND, MAINE

AUTHORITY

1. This report is submitted under authority contained in Section 107 of the River and Harbor Act of 1960, as amended in 1965 and 1970. Specific authority was provided by 1st indorsement of the Chief of Engineers dated 25 March 1971 to a Reconnaissance Report dated 25 February 1971 submitted by the Division Engineer, New England Division.

PURPOSE AND EXTENT OF STUDY

2. The purpose of the study was to determine the engineering feasibility and economic justification for providing a Federal navigation improvement in the vicinity of the town wharf (Stone Pier) on Great Chebeague Island, Cumberland, Maine. A hydrographic survey consisting of soundings and random probings was made in September 1971, from which the characteristics of the material and estimated quantities to be dredged were determined. Data concerning the economics of the area, recreational and commercial boating fleets, and commercial fishing statistics were obtained from various sources including the Great Chebeague Island Association, town officials, field investigations, and published commercial fishing statistics. All Federal, State and local agencies interested or affected by improvement of the area for navigation have been contacted. Conferences have been held with local authorities to discuss the desired improvement and the possible requirements of local cooperation.

DESCRIPTION

3. Great Chebeague Island is located in Casco Bay, approximately 8 miles northeast of Portland, Maine. It is the largest island in the western part of Casco Bay, extending 5 miles in a north-south direction and about one mile in an east-west direction. Cousins Island and Littlejohn Island lie between the mainland and Great Chebeague Island. Vehicular bridges connect Littlejohn to Cousins Island and Cousins Island to the mainland.

4. The island has two principal harbors, one on the northwest side adjacent to Stone Pier and the other, Chandler Cove, at the southerly end of the island. The specific area under study is in the vicinity of Stone Pier. This area is protected from easterly and southeasterly storms by the island itself and from prevailing southwesterly winds during the summer by Division Point on the west side of the island. The mean and spring tide ranges are 9.0 feet and 10.4 feet, respectively. The locality is shown on U. S. Coast and Geodetic Survey Charts Nos. 315 and 1204, and on the map accompanying this report.

5. The area of Great Chebeague Island in the vicinity of Stone Pier is relatively flat with maximum elevations approaching 50 feet above mean sea level. The shoreline is rocky in nature, similar to other islands in Casco Bay. Land is used for truck gardening. In addition there is a nine-hole golf course in the immediate vicinity of the Stone Pier.

TRIBUTARY AREA

6. Great Chebeague is the largest of several islands in Casco Bay included within the boundaries of the town of Cumberland, Maine. The island has no industrial development. It serves chiefly as a summer residence for vacationers. The year-round population on Great Chebeague Island is about 550. Approximately 2,500 additional people reside on the island during the summer months. Most of these people come from the Greater Portland metropolitan area which had a 1970 population of over 150,000. The mainland town of Cumberland, a residential suburb of Portland had a population of 2,765 in 1960 and 4,139 in 1970.

7. Year round residents of Great Chebeague Island are employed in the Portland area or on the island, engaging in lobster fishing, truck gardening and maintenance of summer homes for non-residents. The

island has a resort hotel with tennis courts and a nine-hole golf course, and several miles of paved and unpaved roads. Children living on the island year-round are transported daily by ferry to schools in Cumberland Center for grades 7 through 12.

BRIDGES

8. There are no bridges crossing any portion of the waterway under consideration in this report.

PRIOR REPORTS

9. There have been no prior reports on Great Chebeague Island, and no Federal project has ever been adopted there.

EXISTING PROJECTS

10. The nearest existing Federal navigation project is at Royal River in Yarmouth, three miles to the north. It provides for a channel 8 feet deep at mean low water and 80 feet wide from the state channel in Casco Bay to the commercial wharf at Yarmouth and includes an anchorage of 8 acres, 6 feet deep, downstream of the Interstate 95 Highway Bridge. The project was completed in June 1969.

TERMINAL AND TRANSFER FACILITIES

11. The town of Cumberland maintains two wooden floats adjacent to Stone Pier. The pier is used as a terminal for passenger ferry service to the mainland. The inshore end of the pier serves as a landing for automobiles and other heavy equipment. The mainland ferry terminal consists of a wooden wharf on the southeast side of Cousins Island, about 1.7 miles from Stone Pier.

12. The state owned timber pier in Chandler Cove at the south end of the island is used for a terminal by the Casco Bay Lines passenger ferry which makes scheduled trips around the islands in the bay. There are two small boatyards and several private piers on the island.

IMPROVEMENTS DESIRED

13. Over the years, the area around Stone Pier has shoaled to such an extent that local interests have had to dredge a channel to the pier in order to operate the ferry vessel and receive supplies from the mainland. In addition, there is insufficient depth in the anchorage

area adjacent to Stone Pier to accommodate the existing recreational fleet on the island. Presently, these boats must be moored well offshore to avoid grounding. The non-profit Great Chebeague Island Association was organized in 1969 to encourage improvement of harbors located within the town of Cumberland. This group conceived the plan to dredge around the town wharf and develop an offshore anchorage to improve the economic status of commercial fishermen and promote recreational development of the island.

EXISTING COMMERCE

14. A passenger ferry service and a two-car capacity barge used also for heavy equipment operate between Cousins Island (mainland) and Stone Pier. This service is non-scheduled and operates only when required. A passenger and mail ferry operating out of Portland makes a scheduled stop at the State pier in Chandler Cove as part of its route through Casco Bay. Trips are frequent in summer to accommodate tourists, but average about one a day during winter. The State pier at Chandler Cove is remote from island activity and not readily accessible. There is little space available for parking autos.

15. The non-scheduled passenger ferry makes six to eight round trips per day during the summer and about four trips per day during winter. The auto barge averages three trips a day during summer. Winter trips are on a demand basis and average no more than one a day.

16. There are no records of commercial fish landings at Great Chebeague Island as most of the 12 part-time lobster fishermen land their catch at mainland ports where lobster dealers are located. Twenty-three pleasure craft use the area off Stone Pier for anchorage during the summer. Two charter boats operate from the pier on a demand basis, for fishing trips or sightseeing tours. During the summer season, about 50 pleasure boats visit the island so that passengers may tour the island or play golf.

DIFFICULTIES ATTENDING NAVIGATION

17. The principal navigation difficulty at the town landing is gradual silting of the access channel and anchorage. The controlling depth in the channel is about 5 feet at mean low water. The area on each side of the channel has depths of 2 to 4 feet at mean low water. To

avoid grounding, locally based boats are moored in deep water about 400 feet offshore. Island residents state that boatmen are reluctant to call at the pier for supplies because of inadequate channel dimensions. Recreational and commercial boating is restricted during low water. Improvement of the area would reduce navigation hazards and provide a needed harbor for small craft.

WATER POWER AND OTHER SPECIAL SUBJECTS

18. The entire waterway under consideration is tidal. There are no problems involved in other water resource areas such as water power, flood control, pollution or related subjects. The U. S. Fish and Wildlife Service has furnished a report which states that the navigation improvement as proposed would not significantly affect fish and wildlife resources.

PROJECT FORMULATION

19. In formulating the plan of improvement consideration was given to the size and draft requirements of the existing and projected recreational fleets, assuming navigation difficulties were removed, and to the needs of commercial navigation, specifically a fairway to the Stone Pier.

20. The Great Chebeague Island Association has indicated a preference for improvements to be made near Stone Pier rather than Chandler Cove because of its proximity to the mainland and island activities and available parking facilities. This is a reasonable conclusion. The Association suggested that the dredged material be used to construct a retaining dike and fill area at Division Point, that would serve as a breakwater and provide an inexpensive method of spoil disposal. However, this disposal method would require approval by Federal and state environmental agencies. For purposes of our study, it is assumed that disposal of the material would be at an existing approved dumping ground at sea. To meet the needs of commercial navigation, a fairway 100 feet wide and six feet deep leading to the Stone Pier is considered adequate.

21. To determine the anchorage dimensions required to accommodate the existing and prospective recreational fleets, an analysis was made relating the capacity of the anchorage to the mooring radius of the anchored vessels. The mooring radius is a function of the overall length of boat, slope of mooring line and tide range within the anchorage. For this anchorage the mooring radii are considered to overlap. That is, vessels would not collide because they would be displaced in

the same direction by any wind or wave action. Hence, the anchorage capacity would be significantly increased. From this analysis, it was determined that 7 boats could be moored per acre. Drafts of boats expected to use the anchorage area in the vicinity of Stone Pier range up to 5 feet. However, the average depth of the vessels using the anchorage is about 3 feet. Based on an additional 1 foot allowance each for wave amplitude, pitch allowance and clearance, the considered anchorage depth should be 6 feet. Vessels with drafts greater than 3 feet would be able to anchor in deeper water farther offshore.

PLAN OF IMPROVEMENT

22. The proposed plan of improvement would provide a 100-foot wide fairway, 6 feet deep, 650 feet long, running northwest from Stone Pier with anchorages on either side at the same depth having a total area of 14 acres. The plan of improvement is shown on Plate 1.

SHORELINE CHANGES

23. The improvement may cause only slight changes along the shore within the harbor. Deeper water being nearer the shore may increase the wave attack slightly under storm conditions. However, the interior shoreline, rocky in nature should become relatively stable shortly after improvement. No other significant shoreline changes due to the proposed improvements are expected.

ESTIMATE OF FIRST COSTS

24. An estimate of the first cost of construction of the proposed plan of improvement has been made on the basis of soundings, probings, and field investigations. The materials to be dredged would be primarily sand and coarse gravel. The estimate is based on dredging of materials by dipper dredge with disposal by barge at approved offshore dumping grounds. Unit costs reflect prices prevailing in January 1972 for similar dredging work. Quantities are in terms of in-place measurements and provide for dredging to a depth of 6 feet below mean low water, plus an allowance of one-foot over depth with side slopes of one vertical to three horizontal. The project cost estimate for the proposed improvement is as follows:

TABLE 1 BENEFITS TO RECREATIONAL BOATING

EXISTING PERMANENTLY BASED FLEET

HARBOR: Great Chebeague Island, Cumberland, Maine — 95 Day Boating Season

TYPE OF CRAFT	LENGTH (feet)	No. Of BOATS	DEPRECIATED VALUE Average $	DEPRECIATED VALUE Total $	PERCENT RETURN Ideal	% of Ideal Pres.	% of Ideal Fut.	Gain	VALUE $	ON-CRUISE Avg. Days	ON-CRUISE % of Season	ON-CRUISE Value $
RECREATIONAL FLEET												
Outboards	12-20	2	2,400	4,800	14	80	100	2.8	134			
	21-Up											
Inboards	15-20											
	21-30	2	6,000	12,600	11	70	100	3.3	416			
	31&Up											
Sterndrive	15-20											
	21-25											
	26&Up											
Cruisers	21-30	6	8,300	49,800	9	70	100	2.7	1345	9	9	121
	31-40	8	21,000	168,000	8	65	100	2.8	4704	11	12	564
	41-50	3	45,000	135,000	8	60	100	3.2	4320	19	20	864
	51-UP											
Aux. Sail	15-20											
	21-30	2	7,300	14,600	8	70	100	2.4	350	5	5	1
	31-40											
	41& Up											
Sailboats	8-15											
	16-20											
	21-25											
	26&Up											
TOTALS		23		384,800					11,269			1,567

TOTAL ANNUAL RECREATIONAL BENEFITS = 11,269 - 1,567 = 9,702 SAY $9,70

Charter Boats	2	12,000	24,000	15	70	100.	4.5	$1,080	SAY	$1,100	

TABLE II BENEFITS TO RECREATIONAL BOATING

HARBOR: Great Chebeague Island, Cumberland, Maine — 95 Day Boating Season

TYPE OF CRAFT	LENGTH (feet)	No. Of BOATS	DEPRECIATED VALUE Average $	DEPRECIATED VALUE Total $	PERCENT RETURN Ideal	% of Ideal Pres.	% of Ideal Fut.	Gain	VALUE $	ON-CRUISE Avg. Days	ON-CRUISE % of Season	ON-CRUISE Value $
RECREATIONAL FLEET												
Outboards	12-20											
	21-Up											
Inboards	15-20											
	21-30	1	6,000	6,000	11	90	100	1.0	60			
	31&Up											
Sterndrive	15-20											
	21-25											
	26&Up											
Cruisers	21-30											
	31-40	1	21,000	21,000	8	90	100	0.8	168			
∞	41-50											
	51-UP											
Aux. Sail	15-20											
	21-30	1	7,300	7,300	8	90	100	0.8	58			
	31-40											
	41& Up											
Sailboats	8-15											
	16-20											
	21-25											
	26&Up											
*TOTALS		3		$34,300					$278			

SAY - TOTAL ANNUAL BENEFITS - $300

*Includes 1 Existing Transient

TABLE III BENEFITS TO RECREATIONAL BOATING

NEW BOATS IMMEDIATELY PURCHASED

HARBOR: Great Chebeague Island, Cumberland, Maine — 95 Day Boating Season

TYPE OF CRAFT	LENGTH (feet)	No. Of BOATS	DEPRECIATED VALUE Average $	DEPRECIATED VALUE Total $	PERCENT RETURN Ideal	% of Ideal Pres	% of Ideal Fut.	Gain	VALUE $	ON-CRUISE Avg. Days	ON-CRUISE % of Season	ON-CRUISE Value $
RECREATIONAL FLEET												
Outboards	12-20	2	2,400	4,800	14	0	100	14	672	-	-	-
	21-Up											
Inboards	15-20											
	21-30											
	31&Up											
Sterndrive	15-20											
	21-25											
	26&Up											
Cruisers	21-30	2	8,300	16,600	9	0	100	9	1,494	9	9	129
	31-40	3	21,000	42,000	8	0	100	8	3,360	11	12	403
	41-50											
	51-UP											
Aux. Sail	15-20											
	21-30	2	7,300	14,600	8	0	100	8	1,168	5	5	
	31-40	1	21,000	21,000	8	0	100	8	1,680	11	12	202
	41& Up											
Sailboats	8-15											
	16-20											
	21-25											
	26&Up											
TOTALS		10		$99,000					$8,374			$792

ANNUAL BENEFIT $8,374 - $792 = $7,582 SAY $7,600

TABLE IV BENEFITS TO RECREATIONAL BOATING

NORMAL GROWTH - NEW BOATS

HARBOR: 95 Day Boating Season

TYPE OF CRAFT	LENGTH (feet)	No. Of BOATS	DEPRECIATED VALUE Average $	DEPRECIATED VALUE Total $	PERCENT RETURN Ideal	% of Ideal Pres.	% of Ideal Fut.	Gain	VALUE $	ON-CRUISE Avg. Days	ON-CRUISE % of Season	ON-CRUISE Value $
RECREATIONAL FLEET												
Outboards	12-20	5	2,400	12,000	14	0	100	14	1,680			
	21-Up											
Inboards	15-20											
	21-30	5	6,300	31,500	11	0	100	11	3,465			
	31& Up											
Sterndrive	15-20											
	21-25											
	26& Up											
Cruisers	21-30	18	8,300	149,400	9	0	100	9	13,446	9	9	1,21
	31-40	13	21,000	273,000	8	0	100	8	21,840	11	12	2,62
	41-50	4	45,000	180,000	8	0	100	8	14,400	19	20	2,88
	51-UP											
Aux. Sail	15-20											
	21-30	5	7,300	36,500		0		8	2,920	5	5	
	31-40	5	21,000	105,000		0		8	8,400	11	12	1,00
	41& Up											
Sailboats	8-15											
	16-20											
	21-25											
	26& Up											
TOTALS		55		787,400					66,151			7,8

ANNUAL TOTAL BENEFITS 66,151-7,865 = 58,286

AVERAGE ANNUAL BENEFITS OVER 50 yrs = 58,286 x 0.310 = 18,069 SAY 18,100

PROJECT COST ESTIMATE

Dredging - Ordinary materials		
60,000 c. y. at $4.00	=	$ 240,000
Contingencies (15%)	=	36,000
Total Dredging Cost	=	$ 276,000
Engineering and Design		23,500
Supervision & Administration		23,500
Total Construction Cost		$ 323,000
Aids to Navigation		2,000 *
TOTAL PROJECT COST		$ 325,000

*Estimated

ESTIMATES OF BENEFITS

25. Improvement of the anchorage area and access channel to Stone Pier would result in substantial benefits to the existing and prospective recreational and charter vessels based in the area. It would eliminate shoal conditions which hamper the operation of the island auto barge and attract more transient pleasure craft. Shore facilities would become available at all stages of the tide.

26. Recreational benefits have been computed on the basis of annual net return to the owners, if the boats were "for hire." This net return varies with the size and type of boat and is expressed in terms of the average depreciated value of the craft. The ideal net return is considered to be the maximum return that could be obtained with full unrestricted use of the harbor. For this particular harbor, the ideal net return varies from 14 percent for the outboard boats to 8 percent for the larger craft. This variation in the ideal percentage is based on the length of season, concentration of population, costs of alternative types of outdoor recreation and income range of the using public. An estimate was made of the percent of optimum use which could be received under the proposed improvement. The difference or gain between the present use and use after improvement was considered to be the benefit. A net gain in percent return was taken for shallow draft outboards as well as the larger vessels, because of the lack of adequate depth and restricted mooring conditions.

27. The existing locally based recreational fleet consists of 23 boats which would benefit substantially from harbor improvements. These boats are presently moored about 400 feet offshore in naturally deep water. Provision of an adequate anchorage closer to shore would improve access to these boats. Benefits to the locally based recreational

fleet have been estimated to amount to $9,700 after a proper reduction for time on cruise (See Table I, Page 7). It is considered that other recreational craft on the island would not be transferred to the improved area due to inconveniences to the owners.

28. Local interests have reported that only 50 transient craft presently visit Stone Pier during the summer season due to a lack of safe anchorage and access channel to the pier. With improvement, it is expected that as many as 150 boats per season would stop at the island because the town landing is conveniently located near a summer resort hotel and golf course. There is a small store at the inner end of Stone Pier where food and other supplies may be purchased. Based on a boating season of 95 days and assuming 100 boats would stay for one day and 50 boats for 2 days, the total boat days for the season would amount to 200. This is equivalent to 2 locally based boats. Benefits for these craft have been computed on the same basis as the local fleet and amount to $300 annually (see Table II, page 8).

29. Soon after completion and as a direct result of the improvement, it is estimated that 10 new boats will be purchased by residents of the island and added to the locally based fleet. These boats would be obtained on the basis of full access to the public wharf at all stages of tide and the availability of a sheltered deep water mooring area. Owners of these boats would receive full benefit from the improvement. Annual benefits for these boats have been computed to be $7,600 (see Table II, page 9).

30. Without navigation improvement, growth of the local fleet will be limited by lack of suitable access and mooring space. Although the recreational boating industry, on a nationwide average, is increasing at about 5 percent per year, expansion of the fleet at Great Chebeague Island is not expected to keep pace with the national rate because the majority of property owners are non-residents and are not apt to have as much time available to fully participate in recreational boating activities. A conservative estimate of the rate of growth of the local recreational fleet is about two percent per year, or 55 boats over the next 50 years. The total number of locally based recreational boats expected to use the waterway at the end of 50 years is estimated to be 94, including equivalent transients. Benefits derived from the 55 boats which would be uniformly added to the fleet over the 50-year life of the project would increase from zero, when the project is constructed, to $58,300 at the end of 50 years. The equivalent average annual benefit from the growth of the fleet is estimated to be about $18,100 (see Table IV, page 10).

31. There are two charter boats valued at approximately $12,000 each that presently use the anchorage area. The ideal net return for these vessels is 15 percent based on the same criteria used for recreational boats. An estimate was made of the percent of optimum use which could be received following improvement. The present use was considered to be 70%. Therefore, the difference or gain between the present use and after improvement amounted to 4.5 percent for a total annual benefit of $1,100 (see Table I, page 7).

32. It is considered that improved navigation conditions will not provide substantial monetary benefits to the passenger ferry from Great Chebeague Island to Cousins Island due to the nature of the ferry operation, i.e. unscheduled trips on a demand basis. No increase in passenger trips is expected to result if navigation conditions improve and the ferry is not now subject to tidal delays.

33. The barge used to carry two automobiles or heavy equipment draws 4 feet when fully loaded. The average hourly operating cost of the barge is $25. The controlling depth of the channel leading to the barge berthing area is 4 feet. Allowing an additional 2 feet for clearance, the barge requires a depth of 6 feet to operate. From a mean tide curve for Great Chebeague Island, total possible delay time over a 12.4 hour tidal cycle was found to be 3.3 hours. Assuming only one-half of the total number of trips are subject to delay, tidal delay per trip is given by:

$$\frac{3.3 \text{ hrs.}}{12.4 \text{ hrs.}} \times 3.3 \text{ hrs.} \times 1/2 = 0.44 \text{ hrs.}$$

Based on 350 trips per year, the annual net benefit due to elimination of tidal delays is given by:

$$\$25/\text{hour} \times \frac{0.44 \text{ hrs.}}{\text{trip}} \times 350 \text{ trips} = \$3,850$$

34. The U.S. Fish and Wildlife Service report states that improvement of the harbor would not result in any increase in lobster catch as this resource in the area presently is fished to capacity. However, there would be a small intangible benefit resulting through more convenient access to the lobster boats by the fisherman.

35. The annual boating benefits attributed to the proposed improvements are as follows:

Recreational Boating Benefits

Existing Fleet	$ 9,700
Equivalent Attracted Transients	300
New Boats Immediately Added	7,600
New Boats, Normal Growth	18,100
TOTAL	$ 35,700

Commercial Benefits

Charter Boats	$ 1,100
Auto Barge	3,850
TOTAL	$ 4,950
TOTAL ANNUAL BENEFITS	$ 40,650

APPORTIONMENT OF COST AMONG INTERESTS

36. The benefits attributed to the proposed improvement are 87.8% recreational and 12.2% commercial in nature. Costs will be apportioned to reflect these percentages. The Federal first cost will be 50% of the first cost of construction of that portion of the project allocable to recreational boating and 100% of the first cost of construction of that portion of the project allocable to commercial navigation; the non-Federal first cost will be 50% of the first cost of construction of that portion of the project allocable to recreational boating. The U. S. Coast Guard first cost has been estimated at $2,000 for navigation aids. A breakdown of the first costs follows:

Federal First Costs

1.	50% of 87.8% of total construction costs - (0.50 x 0.878 x 323,000)	$ 141,800
2.	100% of 12.2% of total construction costs - (1.0 x 0.122 x 323,000)	39,400
3.	Aids to Navigation (estimated)	2,000
	TOTAL FEDERAL FIRST COST	$ 183,200

Non-Federal First Costs

50% of 87.8% of total construction costs - (0.50 x 0.878 x 323,000)	$	141,800

ESTIMATE OF ANNUAL CHARGES

37. Annual charges are based on an estimated project life of 50 years and an interest rate of 5-1/2% for both Federal and non-Federal costs. Additional costs for maintenance dredging must also be included in annual charges and are based on past experience of shoaling in similar anchorages. The average shoaling rate is estimated at 2,000 cubic yards per year. In accordance with Federal policies, local interests are responsible for the future maintenance of the improvement to the extent that this improvement is for recreational navigation. It is estimated that the average annual cost of maintenance dredging in the anchorage will be $8,000. The average annual charges are computed as follows:

Federal		
Interest and amortization on first costs - .05906 (183,200)	$	10,800
Maintenance -		
Dredging - 12.2% of $8,000		1,000
Navigation Aids		500
TOTAL	$	12,300
Non-Federal		
Interest and amortization on first costs - .05906 (141,800)	$	8,400
Maintenance -		
Dredging - 87.8% of $8,000		7,000
TOTAL	$	15,400
TOTAL ANNUAL CHARGES	$	27,700

COMPARISON OF BENEFITS AND COSTS

38. A comparison of the estimated total benefits of $40,650 and the estimated annual costs of $27,700 results in a benefit-cost ratio of 1.5.

PROPOSED LOCAL COOPERATION

39. Local interests would be required to provide assurances that the following items would be complied with prior to construction of the project:

a. Contribute 50% of the first costs of that portion of the proposed improvement attributed to recreational boating, estimated at $141,800;

b. Assume full responsibility for all project costs in excess of the $1,000,000 Corps of Engineers' limitation under Section 107 of the 1960 River and Harbor Act, as amended;

c. Perform or contribute the cost of performance of the operation and maintenance of the recreational navigation features proposed under the project, estimated to be $7,000 annually;

d. Provide without cost to the United States, all lands, easements and rights-of-way required for construction of the project and for aids to navigation, upon request of the Chief of Engineers;

e. Hold and save the United States free from damages which may result from construction of the project;

f. Establish regulations prohibiting discharge of pollutants in the waters of the harbor by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, state and local authorities responsible for pollution and control;

g. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

COORDINATION WITH OTHER AGENCIES

40. All Federal, state and local agencies that might have an interest in the improvements at Great Chebeague Island have been contacted. The U. S. Fish and Wildlife Service in its Conservation and Development report has indicated that the proposed dredging would have no significant effects on fish and wildlife resources, nor do notable opportunities for enhancement exist. The report is contained in Appendix A.

DISCUSSION

41. Local interests have been notified of the study findings and of the various items of local cooperation required including a cash contribution as part of the initial cost of construction and assumption of all subsequent maintenance costs. The Board of Selectmen of the Town of Cumberland has indicated by letter to the Division Engineer that the Town cannot at this time undertake such expenditures. This letter is included in Appendix A.

CONCLUSIONS AND RECOMMENDATIONS

42. Insufficient depths in present anchorage area and channel to town wharf curtail full use of the harbor by existing and prospective recreational fleet and commercial vessels. Full use of the harbor can be accomplished by dredging a 14-acre anchorage and 100 ft. wide fairway to depths of 6 feet below mean low water. The resulting benefits to the recreational fleet and commercial vessels, both present and prospective, indicate that the improvement is economically justified with a benefit cost ratio of 1.5. However, local interests have indicated that they cannot fulfill the requirements of local cooperation.

43. Therefore, the Division Engineer recommends no Federal project be constructed at Great Chebeague Island, Maine at this time.

JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer

3 Incls.
as stated

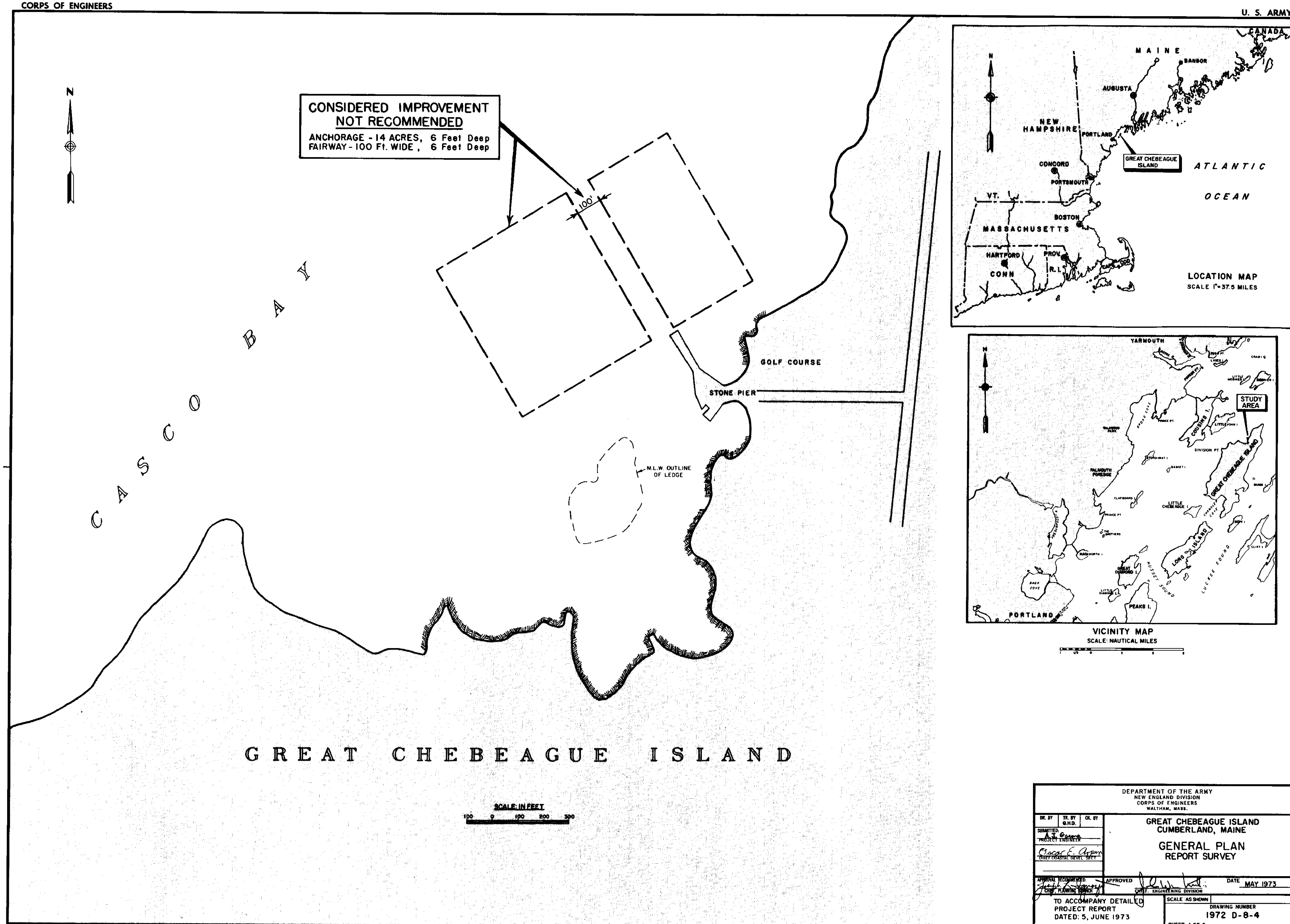
CORPS OF ENGINEERS
U. S. ARMY
N
CONSIDERED IMPROVEMENT
NOT RECOMMENDED
ANCHORAGE - 14 ACRES, 6 Feet Deep
FAIRWAY - 100 Ft. WIDE, 6 Feet Deep
100'
CASCO BAY
GOLF COURSE
STONE PIER
M.L.W. OUTLINE OF LEDGE
GREAT CHEBEAGUE ISLAND
SCALE: IN FEET
100 0 100 200 300
MAINE
BANGOR
AUGUSTA
CANADA
NEW HAMPSHIRE
PORTLAND
GREAT CHEBEAGUE ISLAND
ATLANTIC OCEAN
CONCORD
PORTSMOUTH
VT.
BOSTON
MASSACHUSETTS
HARTFORD
PROV.
CONN
R.I.
LOCATION MAP
SCALE 1"=37.5 MILES
YARMOUTH
STUDY AREA
GREAT CHEBEAGUE ISLAND
LONG ISLAND
PEAKS I.
PORTLAND
VICINITY MAP
SCALE: NAUTICAL MILES
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
DR. BY
TR. BY G.H.D.
CK. BY
SUBMITTED:
PROJECT ENGINEER
CHIEF COASTAL DEVEL. SECT
APPROVAL RECOMMENDED:
CHIEF, PLANNING BRANCH
GREAT CHEBEAGUE ISLAND
CUMBERLAND, MAINE
GENERAL PLAN
REPORT SURVEY
APPROVED
CHIEF, ENGINEERING DIVISION
DATE MAY 1973
TO ACCOMPANY DETAILED
PROJECT REPORT
DATED: 5, JUNE 1973
SCALE AS SHOWN
DRAWING NUMBER
1972 D-8-4
SHEET 1 OF 2

PLATE 1

CORPS OF ENGINEERS

U. S. ARMY

LIST OF PROBINGS

NUMBER	DEPTH OF WATER (ELEVATION BELOW M.L.W.)	DEPTH OF PROBE (ELEVATION BELOW M.L.W.)	PENETRATION	REMARKS
1	3.4	8.0	4.6	Sand and mud
2	4.9	8.0	3.1	" " "
3	5.9	8.0	2.1	" " "
4	6.6	8.0	1.4	" " "
5	7.7	8.0	0.3	" " "
6	8.2			" " "
7	2.3	8.0	5.7	" " "
8	4.3	8.0	3.7	" " "
9	5.5	8.0	2.5	" " "
10	6.3	8.0	1.7	" " "
11	7.3	8.0	0.7	" " "
12	8.0			" " "
13	1.9	8.0	6.1	" " "
14	3.5	8.0	4.5	" " "
15	4.7	8.0	3.3	" " "
16	5.4	8.0	2.6	" " "
17	6.5	11.0	4.5	" " "
18	7.0	11.0	4.0	" " "
19	8.1	11.0	2.9	" " "
20	1.0	8.0	7.0	" " "
21	2.5	8.0	5.5	" " "
22	3.9	8.0	4.1	" " "
23	4.9	9.0	4.1	" " "
24	5.8	10.0	4.2	" " "
25	6.3	11.0	4.7	" " "
26	7.3	9.0	1.7	" " "
27	7.1	12.0	4.9	" " "
28	7.4	10.0	2.6	" " "
29	1.2	8.0	6.8	" " "
30	2.0	8.0	6.0	" " "
31	3.3	8.0	4.7	" " "
32	4.0	8.5	4.5	" " "
33	5.0	12.0	7.0	" " "
34	5.3	10.0	4.7	" " "
35	6.1	11.0	4.9	" " "
36	6.5	10.0	3.5	" " "
37	7.5	12.0	4.5	" " "
38	2.0	6.4	4.4	" " " to refusal
39	2.0	10.8	8.8	" " "
40	2.8	9.8	7.0	" " "
41	3.8	9.0	5.2	" " "
42	4.8	10.0	5.2	" " "
43	6.0	10.0	4.0	" " "
44	5.5	10.0	4.5	" " "
45	5.9	10.0	4.1	" " "
46	6.3	10.0	3.7	" " "
47	1.3	9.0	7.7	" " "
48	2.2	9.0	6.8	" " "
49	2.4	10.0	7.6	" " "
50	2.7	10.0	7.3	" " "
51	3.4	10.0	6.6	" " "
52	7.6	13.0	5.4	" " "
53	4.6	9.0	4.4	" " "
54	4.2	9.0	4.8	" " "
55	3.7	10.0	6.3	" " "
56	0.9	8.0	7.1	" " "
57	1.6	8.0	6.4	" " "
58	1.7	8.5	6.8	" " "
59	1.9	9.0	7.1	" " "
60	2.3	9.0	6.7	" " "
61	6.9	9.0	2.1	" " "
62	2.3	9.0	6.7	" " "
63	1.7	9.0	7.3	" " "
64	1.8	9.0	7.2	Sand and mud
65	0.8	5.8	5.0	" " " to refusal
66	0.8	6.8	6.0	" " " " "
67	1.1	4.1	3.0	" " " " "
68	1.3	9.0	7.7	" " "
69	1.3	8.0	6.7	" " "
70	0.9	8.1	7.2	" " "
71	5.0	8.0	3.0	" " "
72	6.0	9.2	3.2	" " "
73	4.0	10.0	6.0	" " "
74	0.6	0.7	0.1	" " " to refusal
75	1.4	8.0	6.6	" " "
76	1.5	8.1	6.6	" " "
77	1.6	8.0	6.4	" " "
78	1.4	9.0	7.6	" " "
79	1.4	9.0	7.6	" " "
80	1.1	9.0	7.9	" " "
81	0.9	8.0	7.1	" " "
82	6.2	8.1	1.9	" " "
83	6.2	8.1	1.9	" " "
84	5.1	8.0	2.9	" " "
85	2.1	8.0	5.9	" " "
86	+1.1	9.0	10.1	" " "
87	+0.2	8.0	8.2	" " "
88	0.4	8.0	7.6	" " "
89	0.6	8.1	7.5	" " "
90	0.6	8.1	7.5	" " "
91	0.1	8.0	7.9	" " "
92	0.2	7.0	6.8	" " " to refusal
93	0.2	2.2	2.0	" " " " "
94	0.0	4.3	4.3	" " " " "
95	0.2	8.0	7.8	" " "
96	0.2	8.0	7.8	" " "
97	0.3	8.5	8.2	" " "
98	0.3	2.3	2.0	" " " to refusal
99	+1.0	2.2	3.2	" " " " "
100	+2.0	1.0	3.0	" " " " "
101	+1.2	5.5	6.7	" " " " "
102	+0.5	6.7	7.2	" " " " "
103	+0.2	8.3	8.5	" " " " "
104	0.1	8.0	7.9	" " "
105	0.0	8.0	8.0	" " "
106	0.0	8.0	8.0	" " "
107	0.0	8.0	8.0	" " "
108	+0.3	2.5	2.8	" " " to refusal
109	+0.4	0.9	1.3	" " " " "
110	+0.7	1.5	2.2	" " " " "
111	+2.8	2.1	4.9	" " " " "
112	+0.1	8.1	8.2	" " "
113	+0.1	3.7	3.8	" " " to refusal
114	0.2	8.0	7.8	" " "
115	0.0	0.2	0.2	" " " to refusal
116	+0.6	0.8	1.4	" " " " "
117	+2.2	+1.4	0.8	" " " " "
118	+5.4	+5.0	0.4	" " " " "
119	+4.0	+3.0	1.0	" " " " "
120	+3.0	8.0	11.0	" " "
121	0.0	2.9	2.9	" " " to refusal
122	+0.4	+9.0	9.4	" " "
123	+1.6	9.0	10.6	" " "

PROBING NOTES:

3/4 iron pipe forced down by two men
Ref. = refusal, which does not necessarily indicate ledge or rock.

CONSIDERED IMPROVEMENT
NOT RECOMMENDED

ANCHORAGE - 14 ACRES, 6 Feet Deep
FAIRWAY - 100 Ft. WIDE, 6 Feet Deep

E514,000 E515,000 E516,000

N335,000 N334,000

CASCO BAY

GREAT CHEBEAGUE ISLAND

Golf Course

STONE PIER

M.L.W. OUTLINE OF LEDGE

BOULDER (1971)

N

NOTES:

Soundings are in feet and tenths and are referred to the plane of mean low water.

Hydrograraphy from survey of September 1971 by E. Byram.

Field Books: R & H 3127 and 3147.

Coordinates are on the transverse mercator system for the East Zone of Maine.

"The information depicted on this map represents the results of surveys made on the date indicated and can only be considered as indicating the general condition existing at that time."

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY	TR. BY	CK. BY
	G.H.D.	

SUBMITTED: A.J. Cuoco, PROJECT ENGINEER
CHIEF COASTAL DEVEL. SECT.

APPROVAL RECOMMENDED: CHIEF, PLANNING BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

DATE: MAY 1973

GREAT CHEBEAGUE ISLAND
CUMBERLAND, MAINE
SOUNDINGS AND PROBINGS
REPORT SURVEY

TO ACCOMPANY DETAILED PROJECT REPORT
DATED: 5 JUNE 1973

SCALE: 1" = 100'

DRAWING NUMBER
1972 D-8-4

SHEET 2 OF 2

PLATE 2

APPENDIX A

CUMBERLAND, MAINE 04021

May 16, 1973

Division Engineer
New England Division of the Army
Corps of Engineer
424 Trapelo Road
Waltham, Mass. 02154

Dear Mr. Garone,

Subject - Chebeague Island Dredging Project:-

This letter is to advise you that the Town of Cumberland is unable at this time to find the estimated funds to improve the mooring area off from the Town Pier on Chebeague Island, Cumberland, Maine.

On behalf of the Town, I want to thank you for investigating the subject proposal and submitting your report. The report shall be kept on file in the Town Office should the Town desire at some point in the future to pursue this project further.

Very truly yours,

Jared S. A. Clark

Jared S. A. Clark
Town Manager

JSAC/csp